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(54) **SLEEVE WITH INTEGRAL TIE CORD**

MUFFE MIT INTEGRIERTEM SCHNURZUG

GAINE DOTEE DE CORDONS DE LACAGE D'UN SEUL TENANT AVEC LADITE GAINÉ

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Description

Field of the Invention

This invention relates to protective sleeving for electrical conductors, pipes and other elongated substrates and methods of manufacture of such sleeving and, more particularly, to sleeving products formed by weaving and including integrally woven tie cords for fastening the sleeving around a bundle of the elongated articles.

Background of the Invention

There are numerous situations in which it is desirable to provide jacketing or sleeving for cables and piping and other articles as, for example, to provide protection against abrasion, for insulation or for the purpose of channelling a group of wires to prevent them from becoming tangled or snagged and broken when extended adjacent to moving machinery and for obvious purposes such as waterproofing or to organise them into easily identified groupings.

Typical sleeving products of the type referred to are braided, woven or knitted, depending upon the intended use, from materials such as polyester monofilaments and other engineered plastics or from bulky yarns made from materials such as glass fibres. Frequently, products constructed from monofilaments are formed with an open construction so that they provide protection against abrasion while allowing for circulation of air. Sleeving products woven, braided or knitted from bulky yarns formed of materials such as glass fibres or the like, either alone or in combination with monofilaments of synthetics or metal wires, are typically intended to be of a relatively closed construction so as to function as insulators.

For the most applications, it is required that the sleeving be not only inexpensive and durable, but it must be relatively easy and inexpensive to install. Sleeving of the type described is frequently provided in tubular form and is axially slit so that it may be slipped over elongated bundles of articles. It is usual practice that when the axially slit product is applied, it is secured in place by tape and the use of ties or straps which are fastened at spaced intervals. The methods of application described involve a relatively high labour cost and a certain amount of inconvenience because of the need to have a supply of tape, ties or straps conveniently at hand.

Summary and Objects of the Invention

The sleeving products of the invention are formed of natural and/or synthetic fibrous materials including bulky yarns, yarns comprised of one or more monofilaments or wires.

In contrast to the prior art, the invention as claimed in claim 1 provides wrap around woven sleeving with integrally woven tie cords provided at spaced intervals

so that the means for fastening the sleeving in place is always at hand. Since the cord may be an integral part of the fabric formed of the same weft (or "fill") yarn as the remainder of the fabric, sleeving formed according to the invention can be provided with integral tie cord at substantially no incremental cost.

According to the invention as claimed in claim 8, sleeving products are provided comprising interwoven warp and weft yarns which may be monofilament or multifilament form and combinations thereof. In setting up the loom, catch cords are spaced inwardly and/or outwardly with respect to the selvages of the product being formed and are moved upwardly and downwardly by actuation of separate heddle harnesses to effect looping of the weft or fill yarn around the catch cords at the desired intervals, thereby forming tie cords. According to the manipulation of the heddles, the tie cords may extend directly outwardly from the selvages or from between a predetermined number of warp ends inwardly from the selvages. The heddle harnesses may be manipulated so that the tie cord at one selvage of the fabric extends directly outwardly from the selvage, whereas the opposite end extends from a point inwardly from the selvage thereby allowing for the production of sleeving with overlapping edges when tied, would have a generally tear-drop shaped configuration when wrapped and tied around a bundle and viewed in cross-section.

With the foregoing in view, it is the object of the invention to provide relatively inexpensive sleeving for bundling elongated substrates in which the sleeving has integrally formed tie cords.

A further object of the invention is the provision of a woven sleeving for bundling elongated substrates in which the tie cords are fill yarns which extend alternatively from the selvages or from points spaced inwardly from the selvages.

A further object of the invention is a method of weaving sleeving material in which integrally woven tie cords are provided as a part of the weaving operation.

A still further object of the invention is a method of weaving sleeving material in which catch cords are spaced from the fabric selvages and are actuated to extend fill yarns from the selvages of the fabric at predetermined intervals to form tie cords at spaced intervals lengthwise of the sleeving material.

Brief Description of the Drawings

Figure 1 is a schematic view in perspective showing a fragment of sleeving material formed according to the teachings of the present invention;

Figure 2 is a schematic view illustrating the manner of manipulation of the loom harnesses in the weaving of fabric sleeving incorporating the principles of the invention; and

Figure 3 is a further schematic view of the pattern

chain section used in the creation of a tab area in the weaving of fabric sleeving formed in accordance with the present invention.

Detailed Description of the Illustrative Embodiment of the Invention

Attention is first directed to Figure 1 which illustrates in schematic and simplified form a fragment of a fabric sleeve formed in accordance with the invention. As illustrated, the fabric is comprised of flexible warp yarns 10 and fill yarns 12 which are woven together on a conventional box loom. In the weaving process, as understood by those in the art, the warp end 10 are fed from spools at one end of the loom over warp rolls which extend in lengthwise, parallel relationship to one another through eyes located in heddles manipulated by harnesses which are selectively raised and lowered in order to produce the shed through which the fill (or weft) yarn 12 is passed utilising one or more shuttles, as explained below. The fill yarn 12 is moved transversely through the shed and on each pass, the fill yarn 12 is beaten up by a reed to form the fabric of Figure 1. The loom may be a conventional box loom of a type well known in the art, such as is manufactured by Crompton & Knowles Weavers, Inc or Draper. Preferably, the box loom is of the type having a multiple shuttle capability so that the loom has multiple filling capability under control of a box chain so as to allow for the use of two types of fill yarn. As understood by those having ordinary skill in this art, the shuttle for the body of the fabric is moved across the warp ends and the fill yarn is then beaten up. The shuttle moves back to its box and the fill yarn is beaten up again. When required, the second shuttle with the second type of fill yarn is then moved back and forth, the second fill yarn being beaten up on each pass of the shuttle as described above. The second shuttle can continue weaving or the first shuttle can be called into action under control of the box chain. It is to be understood that in the illustrative example of Figure 1, it is preferred that the second shuttle is used whenever a tie cord is required, although a single shuttle may be used in carrying out the invention where the tie cord is to be the same yarn as the regular fill yarn.

In further explanation of the method of the invention, the tie cords 14 are produced in the manner schematically illustrated in Figure 2. As schematically illustrated in Figure 2, the warp yarns are represented as at 10 and the fill yarn at 12. The loom preferably has two shuttles, one represented by the numeral 16 and the other by numeral 18. The tie cords 14 are formed by disposing catch cords 20, represented by broken lines, at discrete intervals outwardly spaced a predetermined distance from each selvage. In constructing a fabric, the box chain is built so that a predetermined number of picks are incorporated between the tie cords 14, thereby establishing a fixed distance between each pair of tie cords. At the point where tie cords are desired, the harness control-

ling the catch cords 16 lifts to the top of the warp shed for one pick before returning to its original position which causes the fill yarn to loop around the cords as the shuttle completes its pass and returns to the opposite side of the loom. The formation of a tie cord 14, as just described, can be seen upon reference to the showing at the right hand side of Figure 2 which illustrates the tie cord 14 extending directly from the right hand selvage as viewed in the Figure. It is understood that the length of the tie cord is selected according to the amount of cord necessary to effect a secure fastening of the sleeve and is determined by the spacing of the catch cord from the selvage.

Figure 2 also illustrates the formation of a tie cord 14 which extends from a point spaced inwardly of the selvage. In further explanation of figure 2, the harnesses controlling the positioning of the warp ends are schematically represented by numbers 1-6 and the harness controlling the catch cords 20 is indicated by the reference character 7. For the warp ends used in forming the portion of the fabric to the right of the area where the tie cord 14 is intended to extend, the harnesses are manipulated in conventional fashion to raise and lower alternative warp ends. In the region of the fabric to the left of the point where the tie cord 14 is intended to extend, harnesses 5 and 6 operate in conjunction with harnesses 1-4 to provide the same weaving pattern as harnesses 1-4 in the intervals between the tie cords. When it is desired that a tie cord be drawn out of the body of the fabric thereby creating a tab area, the box chain is set so that the harnesses 5 and 6 are not raised, allowing the tie cord 14 to float over those warp ends controlled by the harnesses controlling the warps in the tab area. As in forming the right hand tie cord loop, a separate harness represented by the numeral 7 controls the raising and lowering of the left hand catch cord so that the shuttle loops around the catch cord a predetermined distance from the left hand selvage. Once the tie cord has been formed, the original fabric pattern is re-established and continues for the number of picks required to establish the predetermined distance between pairs of tie cords.

Figure 3 is a representative diagrammatic sectional view of a pattern chain illustrating the concept of weaving a sleeving having overlapping or tab areas. In figure 3, the critical picks are the picks identified as Nx_1 and Nx_2 . As illustrated in Figure 3, the picks Nx_1 and Nx_2 are the picks which lift the catch cords 20 so that the fill yarn catches it and forms a loop. As indicated above, the picks Nx_1 and Nx_2 are inserted at locations depending upon the desired spacing between tie cords. The basic pattern illustrated is for illustrative purposes only, and it should be understood that other weaving patterns may be employed and that the spacing and pattern illustrated is provided for purposes of illustrating the invention.

As indicated above, various textile yarns of both multifilament and monofilament form may be used in weaving sleeves according to the present invention. A

preferred monofilament material is a polyester monofilament yarn. Where additional abrasion resistance is required, the monofilament may be nylon. Bulky yarns made of glass fibres or other textile materials may also be employed. In the illustrative embodiment, cotton yarns were utilised for the warp yarns, the fill yarns and the tie cords, although it is contemplated that synthetic resinous materials or other materials will be employed, depending upon the application for which the sleeve material is intended.

Claims

1. A wrap-around flexible fabric sleeve having a substantially rectangular shape when flattened and being adapted for bundling elongated substrates such as wires and cables,

said fabric sleeve being wrapped around the substrates with the fabric selvages in adjacent relationship;
said sleeve comprising interwoven warp and weft yarns and having a plurality of pairs of tie cords extended in the weft direction beyond the selvages at discrete intervals lengthwise thereof;
said tie cords being interwoven with the warp and weft yarns.

2. A wrap-around sleeve according to claim 1, wherein the tie cords are comprised of the same yarn as the weft yarn.

3. A wrap-around sleeve according to claim 1, wherein the tie cords are of a different yarn than the weft yarn.

4. A wrap-around sleeve according to claim 1, wherein at least one of the tie cords of each pair of tie cords extends outwardly from locations on the body of the sleeve inwardly spaced from the selvage.

5. A wrap-around sleeve according to claim 4, wherein both tie cords of each pair extend outwardly from locations on the body of the sleeve which are inwardly spaced from the selvage.

6. A wrap-around sleeve according to claim 5, wherein the sleeve is comprised of polyester monofilament.

7. A wrap-around sleeve according to claim 6, wherein the sleeve has an open construction.

8. A method of weaving a fabric sleeve of substantially rectangular shape, said sleeve being flexible and being adapted to be wrapped around a bundle of elongated substrates, said method comprising:

weaving the sleeve on a shuttle loom from flexible warp and fill yarn;
displacing catch cords predetermined spaces away from the selvages of the sleeve fabric being woven; and
lifting the catch cords in timed relation to the preselected fill yarns to effect a looping of the preselected fill yarn around the catch cords, thereby creating a tie cord extended from the fabric selvage by an amount equal to the displacement of the catch cords.

9. A method according to claim 8, the method further comprising forming a tab area between the selvage and the point where the tie cord extends from the fabric by suppressing the lifting of the warp yarns in the tab area to cause the preselected fill yarn to float over the suppressed warp yarns.

10. A method according to claim 8, wherein the loom is a multiple shuttle loom and the method comprised using a separate shuttle for passing the preselected fill yarn.

11. A method according to claim 10, wherein the preselected fill yarn is a yarn different from the balance of the fill yarn comprising the fabric.

12. A method according to claim 11, wherein the preselected fill yarn has a different diameter from the rest of the fill yarn.

Patentansprüche

1. Flexible Umwickel-Gewebehülse mit einer im wesentlichen rechteckigen Form, wenn abgeflacht, und geeignet zum Bündeln langgestreckter Substrate, z.B. Drähte und Kabel, wobei die Gewebehülse um die Substrate gewickelt wird, wobei die Gewebekanten in benachbarter Beziehung sind; wobei die Hülse verwobene Kett- und Schußgarne aufweist und eine Vielzahl von Paaren von Binde-schnüren hat, die in der Schußrichtung über die Kanten an diskreten Intervallen in deren Längsrichtung erstreckt bzw. verlängert sind; wobei die Binde-schnüre mit den Kett- und Schußgarnen verwoben sind.

2. Umwickel-Hülse gemäß Anspruch 1, wobei die Binde-schnüre gebildet sind aus demselben Garn wie das Schußgarn.

3. Umwickel-Hülse gemäß Anspruch 1, wobei die Binde-schnüre aus einem Garn unterschiedlich von dem Schußgarn gemacht sind.

4. Umwickel-Hülse gemäß Anspruch 1, wobei wenig-

stens eine der Bindschnüre jedes Paares von Bindschnüren sich nach außen von Stellen an dem Körper der Hülse erstreckt, die einwärts von der Kante beabstandet sind.

5. Umwickel-Hülse gemäß Anspruch 4, wobei beide Bindschnüre jedes Paares sich nach außen von Stellen an dem Körper der Hülse erstrecken, die nach innen von der Kante beabstandet sind.
6. Umwickel-Hülse gemäß Anspruch 5, wobei die Hülse aus Polyester-Monofilament gebildet ist.
7. Umwickel-Hülse gemäß Anspruch 6, wobei die Hülse einen offenen Aufbau hat.
8. Verfahren zum Weben einer Gewebehülse von im wesentlichen rechteckiger Form, wobei die Hülse biegsam ist und geeignet ist, um ein Bündel von langgestreckten Substraten gewickelt zu werden, wobei das Verfahren aufweist:

Weben der Hülse an einem Schiffchenwebstuhl aus biegsamem Schuß- und Füllgarn;
Verschieben von Fangschnüren in vorbestimmten Abständen weg von den Kanten des zu webenden Hülsgewebes; und
Heben der Fangschnüre in zeitlicher Beziehung zu den vorgewählten Füllgarnen, um eine Schleifenbildung des vorgewählten Füllgarns um die Fangschnüre zu bewirken, wodurch eine Bindschnur erzeugt wird, die sich von der Gewebekante um einen Betrag gleich der Verschiebung bzw. Versetzung der Fangschnüre erstreckt.

9. Verfahren nach Anspruch 8, wobei das Verfahren ferner aufweist die Bildung eines Endstück- bzw. Anschlußbereichs zwischen der Kante und dem Punkt, wohin sich die Bindschnur von dem Gewebe erstreckt durch Unterdrücken der Hebung der Schußgarne in dem Endstückbereich, um das vorgewählte Füllgarn zu veranlassen, über die unterdrückten Schußgarne zu flottieren.
10. Verfahren gemäß Anspruch 8, wobei der Webstuhl ein Vielfachschiffchen-Webstuhl ist und das Verfahren die Verwendung eines getrennten Schiffchens zum Durchführen des vorgewählten Füllgarns aufweist.
11. Verfahren nach Anspruch 10, wobei das vorgewählte Füllgarn ein Garn ist, das unterschiedlich ist von dem Rest bzw. übrigen Teil des Füllgarns, welcher das Gewebe aufweist.
12. Verfahren nach Anspruch 11, wobei das vorgewählte Füllgarn einen Durchmesser hat, der unter-

schiedlich ist gegenüber dem Rest des Füllgarns.

Revendications

1. Gaine d'enveloppement en tissu flexible ayant une forme sensiblement rectangulaire lorsqu'elle est aplatie et étant adaptée à mettre en botte des articles allongés tels que des fils et des câbles, ladite gaine en tissu étant enroulée autour des articles, les lisières du tissu étant adjacentes ;

ladite gaine comprenant des fils de chaîne et des fils de trame entre-tissés et comportant une pluralité de paires de cordons de laçage s'étendant dans le sens de la trame au-delà des lisières à des intervalles définis dans le sens de sa longueur ;
lesdits cordons de laçage étant entre-tissés avec les fils de chaîne et les fils de trame.

2. Gaine d'enveloppement selon la revendication 1, dans laquelle les cordons de laçage sont faits du même fil que le fil de trame.
3. Gaine d'enveloppement selon la revendication 1, dans laquelle les cordons de laçage sont faits d'un fil autre que le fil de trame.
4. Gaine d'enveloppement selon la revendication 1, dans laquelle au moins l'un des cordons de laçage de chaque paire de cordons de laçage s'étend vers l'extérieur depuis des emplacements sur le corps de la gaine espacés vers l'intérieur de la lisière.
5. Gaine d'enveloppement selon la revendication 4, dans laquelle les deux cordons de laçage de chaque paire s'étendent vers l'extérieur depuis des emplacements sur le corps de la gaine qui sont espacés vers l'intérieur de la lisière.
6. Gaine d'enveloppement selon la revendication 5, dans laquelle la gaine est faite d'un monofilament de polyester.
7. Gaine d'enveloppement selon la revendication 6, dans laquelle la gaine a une structure ouverte.
8. Procédé de tissage d'une gaine en tissu de forme sensiblement rectangulaire, ladite gaine étant flexible et étant adaptée à être enroulée autour d'une botte d'articles allongés, ledit procédé comprenant les phases consistant à:

tisser la gaine sur un métier à navettes à partir de fils de chaîne et de fils de trame flexibles ;
déplacer les cordons de retenue à des intervalles prédéterminés loin des lisières du tissu de

la gaine étant tissé ; et
lever les cordons de retenue en synchronisation avec les fils de duite présélectionnés afin de réaliser une boucle du fil de duite présélectionné autour des cordons de retenue, de manière à créer un cordon de laçage s'étendant depuis la lisière du tissu sur une distance égale au déplacement des cordons de retenue. 5

9. Procédé selon la revendication 8, le procédé comprenant en outre la formation d'une zone unie entre la lisière et l'emplacement où le cordon de laçage s'étend depuis le tissu en supprimant la levée des fils de chaîne dans la zone unie pour amener le fil de duite présélectionné à flotter sur les fils de chaîne supprimés. 10 15

10. Procédé selon la revendication 8, dans lequel le métier est un métier à navettes multiples et le procédé comprend l'utilisation d'une navette distincte pour passer le fil de duite présélectionné. 20

11. Procédé selon la revendication 10, dans lequel le fil de duite présélectionné est un fil différent du reste des fils de duite composant le tissu. 25

12. Procédé selon la revendication 11, dans lequel le fil de duite présélectionné a un diamètre différent du reste des fils de duite. 30

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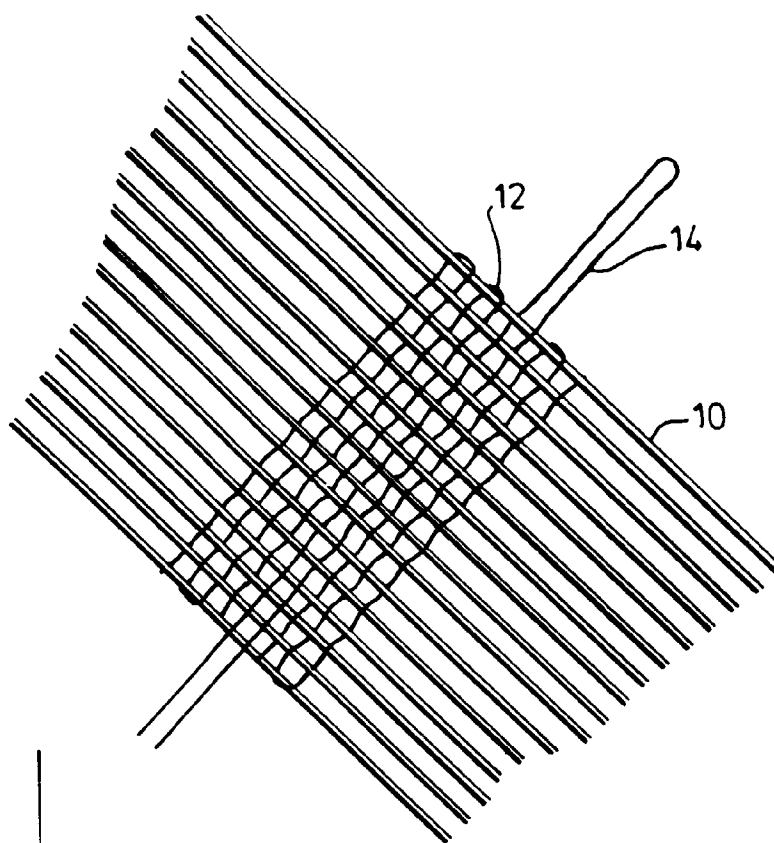


FIG. 1

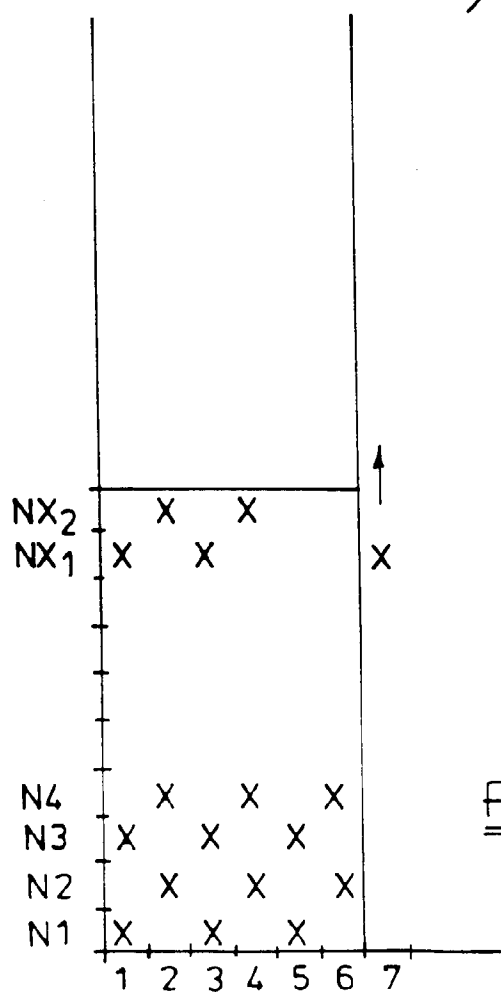


FIG. 3

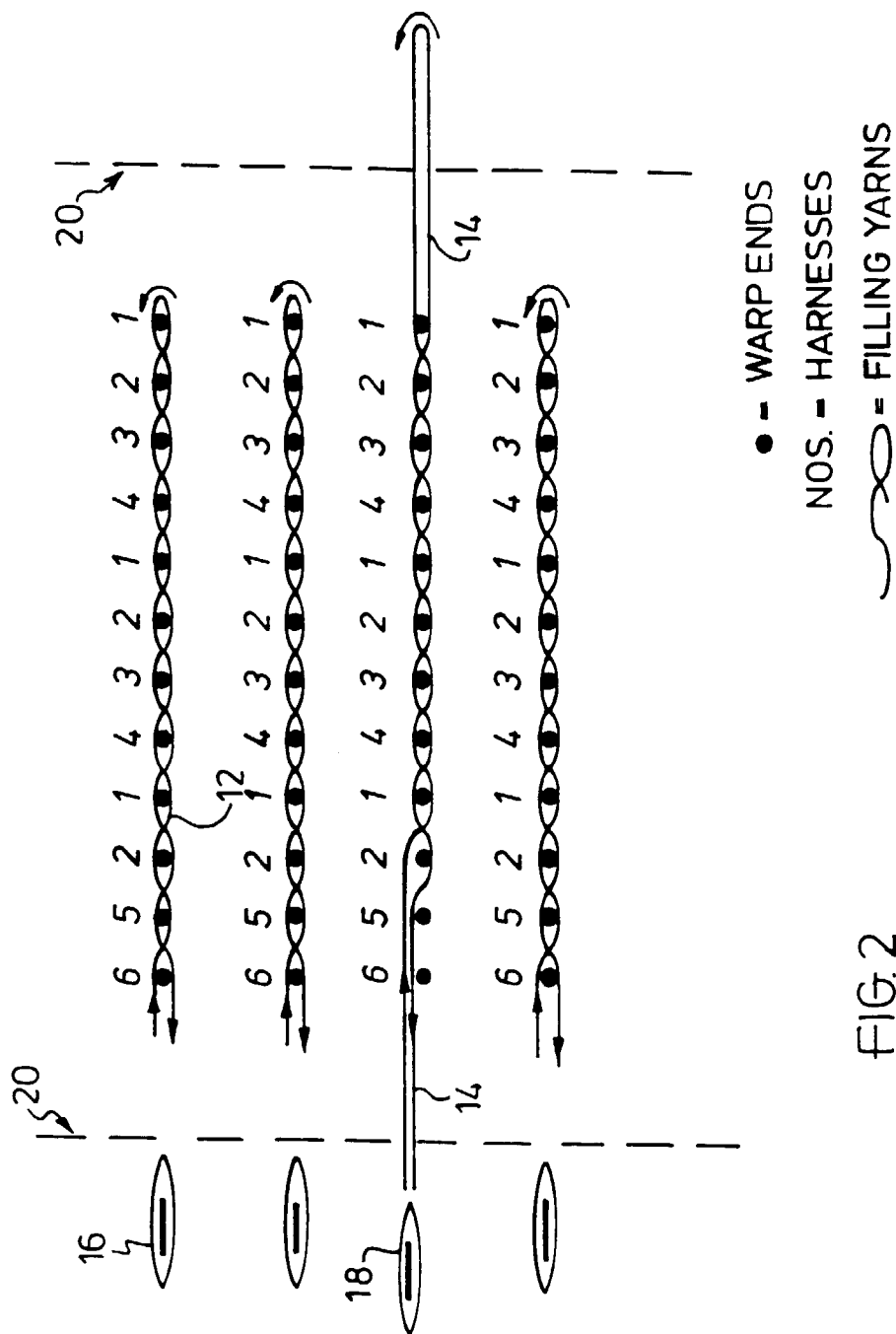


FIG. 2